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Chapter 8

Establishment and management of sown finishing pastures

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INTRODUCTION

Over the last decade at least seven improved pasture cultivars which have application in the summer moist finishing regions of Manawatu, coastal and south Otago and Southland have been released.

Ryegrass and white clover are the dominant pasture components in these regions. Production from such pastures is limited by cool winter temperatures in Otago/Southland and by summer moisture stress in Manawatu (see Chapter 7). Improved cultivars of ryegrass and white clover, alternative species and better management strategies can be used to lessen the effect of these limitations. The establishment and management aspects are discussed in this chapter.

ESTABLISHMENT

There are no major limitations to pasture establishment in these regions. The gentle topography, favourable climate and high soil fertility offer flexibility in choice of establishment method and time of sowing. Pasture establishment is therefore largely renewal either as part of a cropping programme or simply to incorporate new plant material into established or run out ryegrass-clover pastures.

Grasses

Soil moisture level and temperature will affect the germination of any species sown. Perennial ryegrasses are tolerant of low moisture and low temperature for germination and these characteristics combined with high seedling vigour enable satisfactory establishment even when autumn rains are delayed. The performance of winter active annual and short term ryegrasses, e.g. Tama, Moata and Manawa are more influenced by time of sowing and germination than perennial ryegrasses. Early sowing of these ryegrass cultivars is essential to ensure their full potential for winter production is achieved, especially so for annuals. Early autumn sowing is also important for Matua prairie grass and late sowings will be slow to germinate and establish because of rapidly declining soil temperatures. Treatment of seed with fungicide (thiram or captan at 5 g ai/kg of seed) prior to sowing, in addition to that normally applied to control head smut (Baytan F17 at 1.3 g/kg of seed), is recommended and this becomes increasingly important as soil temperatures decline.

In areas experiencing dry autumns spring sowing is a practical alternative for prairie grass. Also because it is a perennial Matua may be preferred to ryegrasses where winter growth is important and there are problems with the regular establishment of annual and short term ryegrasses. Irrigation removes limitations to the use of ryegrass by providing guaranteed moisture for early establishment and improves the persistence of Manawa and Moata by reducing the effect of moisture stress during summer on tiller survival. Recommended sowing rates are shown in Table 8.1.

Table 8.1 Recommended seeding rates of pasture cultivars for finishing pastures.

Cultivar	Recommended seeding rate (kg/ha)
Nui	15-20 (as sole grass)
	15 (if Manawa included)
Matua	35
Manawa	25-30 (as sole grass)
	5 (with perennial ryegrass)
Moata/Tama	30
Pawera	6 (8-10 kgs/ha if pure sward)
Pitau	4

Clovers

Clovers will germinate and establish adequately from either autumn or spring sowing. The main limitation to establishment success is the grazing management received post emergence. Seedling

clovers are susceptible to shading by the faster growing ryegrasses particularly after autumn sowings when falling temperatures restrict clover growth more than grasses. Frequent defoliations are required during winter and early spring to ensure clovers receive adequate light especially when sown with vigorous ryegrasses. Pitau white clover is slower to establish than Huia and thus early grazing management is particularly important for this cultivar. Wet soil conditions in winter occur widely in these regions and where this is likely to interfere with early grazings, spring sowing is a better alternative. This has the added advantage of clover establishing with rising soil temperatures and hence they are less vulnerable to shading by companion grasses, especially in Southland.

Minimum tillage techniques

Minimum tillage techniques enable the establishment or renovation of pastures without conventional cultivation. They generally involve the application of herbicide to remove some (overdrilling) or all (direct drilling) of the existing vegetation and then the introduction of seed by specialised drills. These techniques are particularly relevant in areas such as Otago-Southland where all grass farming systems have reduced the opportunity for new pasture establishment. Compared with conventional cultivation they are competitive in cost and minimise the period of low pasture production.

The use of either direct drilling or overdrilling will be influenced by the species sown and the resident pasture composition. If the object is to replace existing pasture with improved species or cultivars then maintaining resident plants is undesirable and blanket spraying with a herbicide (e.g. glyphosate) to kill the entire sward before drilling is recommended. Blanket spraying prior to drilling is also recommended for Moata and Tama ryegrasses to ensure their potential for high production in the first winter and spring is achieved, except where they are drilled into clover dominant swards in autumn for annual or biennial renewal. Matua prairie grass persists and produces best as the sole grass component of a sward and therefore blanket spraying, to control existing grasses prior to drilling, is recommended.

Improved species may be incorporated by overdrilling for specific seasonal production requirements. For example, where productive ryegrass-white clover pastures already exist, introducing Pawera by overdrilling will retain existing species and improve summer production.

Minimum tillage techniques are covered in more detail in Chapter 10.

MANAGEMENT

Persistence

Pawera red clover and Matua prairie grass are vulnerable to mismanagement because of their upright growth habit and grazing too frequently or set stocking will reduce their production and persistence. Under appropriate management (30-35 day spells in summer) Pawera has persisted under sheep grazing in Southland to still contribute 35% of summer production after 4 years and in Manawatu it contributed 10% to summer production in a 6 year old cattle grazed pasture. Pure swards of Pawera are producing well 10 years from sowing in West Otago when managed principally for conservation.

The long term persistence of Matua is less clear, however in Manawatu a 4 year old pasture was Matua dominant in winter (54% of winter production) and yielded 25% more DM annually than a Nui ryegrass pasture. Prairie grass has the ability to shed seed prolifically. This can assist the maintenance of plant density although results depend on successfully managing a pasture containing developing seedlings during the crucial winter period.

Red clover and prairie grass are both sensitive to treading damage and severe grazings during wet conditions should be avoided. Ryegrasses are relatively tolerant of treading and where grazing on wet soils cannot be avoided, winter active ryegrasses should be used in place of Matua prairie grass.

The persistence of perennial ryegrass and white clover is little affected by management in these regions, however, production of the more erect cultivars Nui and Pitau can be limited by frequent grazing.

Production

Virtually all pastures are sown with mixtures of grass and clover. These species are complementary with grasses providing the bulk of cool season production and clovers producing best during warm summer conditions. Further benefits of the association occur with clover providing the nitrogen essential for grass growth, and high quality feed particularly during summer. Encouraging this shift in dominance from cool season to summer active species is a vital aspect of pasture management regardless of the particular cultivars sown. The importance of lengthening spelling intervals and reducing grazing intensity for maximum clover production over summer and then a period of frequent more intense grazing in autumn to favour the ryegrass for cool season production is essential to exploit the benefits of grass-clover pastures. Excessively long spells, especially in winter, also

limits this association in Manawatu, because the shading of clovers and reduced ryegrass tiller production that occurs will reduce subsequent summer production.

Using pasture species or management options to reduce the seasonal limitations to growth discussed in Chapter 7, means stressing grasses for winter production and clover for summer production.

Winter active species. Use of cool season active ryegrasses, such as hybrids and annuals will increase pasture growth rates above that attainable from perennial ryegrasses. For example, Manawa will produce up to 50% more than Ruanui over winter, however its summer production can be low and is strongly influenced by management. Being more erect than perennial ryegrass it has a higher proportion of tillers with growing points above grazing height and even one hard grazing (2-3 cm) in summer can severely reduce tiller populations. Infrequent (30 day spells) and lax grazing (5-7 cm residual) in summer will prolong its life. Its persistence is also governed by summer moisture regime and in areas with wet summers or under irrigation it will persist for longer than its normal 2-3 years. Biennial (Moata) and annual (Tama) ryegrasses offer even higher winter and spring growth rates than Manawa but have the disadvantage of requiring more frequent renewal. Low summer production is a common feature of hybrid and annual ryegrasses and each should be sown with summer active clovers, such as Pawera and Pitau to ensure adequate annual production. Nitrogen fertiliser use is not widespread for sheep and beef farming in these regions, however, its use is a further option for boosting cool season growth rates. Responses to N vary with region, season and rate of application. Best responses occur following early spring application and response rates (kg DM/kg N applied) of 10-12 in Manawatu and 20-22 in Otago and Southland can be expected for rates of application up to 50 kg N/ha. Response rate on winter active ryegrass and prairie grass could be expected to exceed that on perennial ryegrass.

Matua prairie grass produces as much as short term ryegrasses in winter, and being a perennial, does not require regular re-establishment. Also, it has the added advantage of good summer production and will exceed that of perennial ryegrass through this period. These advantages will only be realised with long spelling intervals (60 days autumn and winter, 35 days summer and 30 days spring) and short grazing durations of 3-4 days at most. With such management it will tolerate hard grazing, however if defoliations are unavoidably frequent they should be lax with 6-7 cm of stubble remaining after grazing, Lax grazing does not lead to the build up of rank unpalatable pastures in late spring and summer as occurs with perennial ryegrasses because seed heads of Matua are palatable to grazing stock.

Summer active species. In finishing regions a lack of quality feed from mid summer to autumn is a severe limitation, Ryegrasses lack both productivity and quality in mid summer and white clover growth can be reduced by moisture stress. Pawera red clover produces a large quantity of high quality feed over this period and inclusion in ryegrass-white clover mixtures will increase both summer and annual production. For example, in Manawatu a Nui-Pawera-Pitau pasture produced 80% more over the January-April period than a similar pasture without red clover. Infrequent grazing is necessary to ensure maximum production. Spelling for 6 weeks in summer compared with 4 weeks increased red clover production by 60% annually and by 100% during summer.

Management systems.

Cultivars of grasses and clovers differ in their aggressiveness, and thus have different competitive effects on each other. The farming system in which they are used and the region determines the most suitable combination of cultivars for sowing and hence the management requirements.

Aggressive grasses (Nui, Ariki and Matua) require aggressive clovers (Pawera, Pitau) for the maintenance of optimum grass-clover balances. These cultivars are more open and erect in growth habit than older cultivars and generally require infrequent grazings for maximum production. Under frequent grazing systems their superiority will not be fully realised. As such they fit best into a year-round rotational grazing system where grazing frequency varies from 60-80 days in winter, 15-20 days in spring, but 25-30 days where Matua is the main grass component and increasing to 30-40 days in summer to maximise the contribution from the clover component. Harder grazings in autumn encourage the swing from clover dominance to grass dominance for winter production where white clover is the only clover. However with Pawera, hard autumn grazings may not be sufficient to create grass dominance. Pawera dominance can occur over a long growing season in Manawatu and subsequent spring grass production is inevitably reduced. Where this occurs, shorter rotations in summer of 28-30 days will control red clover dominance and result in better spring production from the grass component.

Because of the requirement for year-round rotational grazing, aggressive grass/aggressive clover mixtures are most suited to cattle fattening systems.

Such mixtures are productive in Otago-Southland also but because of low cattle populations their use is confined mainly to special purpose situations, e.g. lamb fattening, conservation, or where sheep are rotationally grazed all year.

Huia, a less aggressive white clover than Pitau, is the more commonly sown cultivar in Otago and Southland but does not compete as well with aggressive grasses as Pitau or Pawera and low clover contents result. Several management strategies are available to improve clover production from such pastures. Long rotations of 60-80 days in winter are still desirable to achieve the best from the grass component. However, set stocking in spring leads to higher clover production in summer and this can be capitalised on for stock finishing with a return to 30-40 day rotations over summer. Set-stocking in spring slightly reduces the production from the grass component but despite this, in ewe + lambs systems, higher lamb growth rates have been demonstrated under set stocking than under rotational grazing. Fostering grass dominance for winter is easier under these systems because of the less aggressive nature of the clover.

Choice of grazing animal is a further management tool to manipulate composition in ryegrass-white clover pastures. Compared with sheep, cattle encourage a higher clover content by reducing ryegrass tiller density and by exerting less selective grazing pressure on the white clover and they can be used to prepare higher clover content pastures for summer finishing. Control of late spring pasture production is also essential to prevent under utilised production from hindering summer clover growth. Mechanical topping of pastures, conservation of surplus production and use of chemicals (e.g. paraquat, mefluidide) to reduce grass growth are all strategies that can be used to ensure better clover growth in summer.

Once the summer dry constraints of North Otago and Canterbury are removed by irrigation the management alternatives for the summer wet environment also apply to these regions. The most important effect of irrigation is to increase pasture growth and quality over summer and early autumn. Although it removes a major limitation to growth of ryegrass-white clover pastures in summer dry areas, it does not necessarily reduce the importance of sowing pastures with newer cultivars or even summer active species. Irrigation can increase clover content of pastures in summer although the grass cultivar sown will influence this. In Canterbury, Nui is more responsive to irrigation than Ruanui or Ariki and where Nui is used irrigation has less effect on grass clover balance. With Nui/Pawera/Pitau pastures in Manawatu the ryegrass and clovers respond equally to irrigation and grass-clover balance remains similar to an unirrigated pasture, Although the increase in clover content of irrigated Ruanui pastures improves pasture quality, highest yields and best response to irrigation will occur with the most productive cultivars, thus Nui or Matua with Pawera and Pitau or Huia should be sown in irrigated pastures.

Feeding value

Within each species the quality of improved cultivars as measured by digestibility, animal intakes and animal performance is similar to that of the respective older cultivars and agronomic superiority is the most important factor in the choice for sowing. Differences in herbage quality do, however, exist between species and may influence the choice of species for sowing. Manawa, Moata and Tama ryegrasses are all higher in digestibility and palatability to grazing stock than perennial ryegrasses. Matua is similar to Tama and Moata for animal liveweight gains and its superiority over perennial ryegrass is accentuated by its ability to maintain quality and palatability even during flowering,

Cultivar differences in quality may occur indirectly. Nui is less susceptible to crown rust in summer and autumn than is Ruanui and thus it remains more palatable to grazing animals. Irrigation enhances the quality of all ryegrasses by reducing the incidence of both rust and accumulated dead material in the pasture.

The superior feeding value of clovers over grasses is widely acknowledged and maintaining high clover content in pastures is desirable to increase overall quality particularly in summer when ryegrasses are low in digestibility.

Conservation

Herbage conservation as hay or silage allows excess pasture production from one season of the year to be stored for use at times of limited production. Silage in spring is usually harvested from grass dominant swards. Pastures should be cut at an early vegetative stage of growth when the herbage has a high digestibility. It should be double chopped and wilted for ½-1 day to raise the DM content, limit the fermentation in the stack and allow better compaction during the ensiling process. In a summer wet environment pasture surpluses can occur in summer and this can mean using clover dominant swards. These pastures have lower sugar and higher protein levels than grass dominant swards and therefore should be cut at the early flowering stage of

clover growth, wilted and mixed with grass dominant swards for ensiling. Alternatively, additives (e.g. molasses) can be used to raise sugar levels and ensure a satisfactory fermentation where grass content of the ensiled material is low.

Hay making is an alternative for conservation of summer supluses. Where hay making is a specific aim, summer active species such as red clover should be used. Clover dominant swards should be cut at the full flower stage of growth and dried as quickly as possible to ensure maximum quantity and quality. Use of a crimper or chemical additives such as potassium carbonate can be used to accelerate drying in regions where natural drying is slow.

Conservation involves longer spells than is normal between grazings and this should be taken into account in the choice of species. The more erect growth of Pitau enables it to better compete with the grass in hay or silage crops. Long spelling of red clover for hay production in summer results in low grass contents for subsequent spring production. Using an aggressive grass such as Matua prairie grass with red clover when required for hay production helps to maintain a better grass composition for winter and spring.

SUMMARY

1. The summer wet finishing country of New Zealand characteristically has highly developed soils which have resulted from decades of intensive pastoral farming.
2. In order to capitalise on this development, better cultivars and alternative species are available to overcome the limitations to growth of the traditional ryegrass-white clover pastures.
3. Establishment requirements of new cultivars are generally similar to those of respective older cultivars.
4. Grazing management requirements are more precise.
5. To achieve the extra production their higher genetic merit allows, and to capitalise on the strong seasonal growth potential resulting from the incorporation of additional species into ryegrass-white clover pastures, the frequency and severity of grazing must fit the requirements of the pasture plants while also fitting animal nutrition requirements.

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Discussion

PART IV — SUMMER-WET FINISHING COUNTRY

Q. *What is the correct ryegrass seeding rate to ensure satisfactory white clover establishment?*

A. **A** seeding rate of 15-20 kg/ha is acceptable, but grazing management that checks ryegrass suppression of white clover is the key factor during establishment. In a trial where fungicide-treated ryegrass seeds were used, one-half the seeding rate quoted here resulted in seedling emergence equivalent to that achieved from the full seeding rate with untreated seed.

Q. *What can be done to encourage white clover content in high fertility, grass dominant pastures?*

A. Management is important in keeping a satisfactory species balance. Heavy set-stocking over lambing to weaning, and conservation of late spring surplus pasture will encourage white clover content in summer. (As an aside, it should be noted here that red clover which is more aggressive than white clover will result in a much higher legume contribution to yield).
While these practices will achieve high feed quality, maintaining grass quantity in summer is still very important for finishing stock. Thus, spring set stocking must be followed by rotational grazing since continued set stocking will depress total herbage production and reduce cool season production.
However, weather conditions (drought) will often override all other factors including management so that legume dominance may never be achieved.

Q. *How useful are Matua prairie grass and Pitau white clover in Southland?*

A. While Pitau yields relatively better than Huia during cool season& its absolute annual yield is less. Pitau is more useful as you move north. Matua is probably not suitable to Southland's intense, frequent grazing pattern during spring. Under the mild conditions of finishing areas in New Zealand, ryegrass/white clover pastures are still the basic choice.

Q. *Do recommended pasture mixtures differ for different finishing systems, e.g. steers versus lambs?*

A. The more erect cultivars (e.g. Pawera) often don't perform well under intense grazing and require long spells (up to 6 weeks) to maximise production. They are therefore less suitable for sheep grazing systems than for cattle, although given the appropriate management, the new upright cultivars will perform well under both sheep and cattle.